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DAMPING CHARACTERISTICS OF PANELS TREATED BY ACUSHNET PROCESS C--ETC(U)  
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U. S. NAVY UNDERWATER SOUND LABORATORY  
FORT TRUMBULL, NEW LONDON, CONNECTICUT

6 DAMPING CHARACTERISTICS OF PANELS TREATED  
BY ACUSHNET PROCESS COMPANY.

by

10 Howard N./Phelps, Jr.

USL Technical Memorandum No. 933-178-64

11 24 June 1964

#### INTRODUCTION

This technical memorandum presents the results of vibration damping tests that were made on five panels on which three different polyurethanes were sprayed by the Acushnet Process Company, New Bedford, Massachusetts.

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#### PROCEDURE

Three 30" X 30" X 1/8" and two 30" X 30" X 60 mil steel plates were sprayed with ElastaCast compounds E902, E903, and E905. The thickness of each coating was approximately .020". ElastaCast is the trade name of liquid casting materials produced by the Acushnet Process Company.

A description of the instrumentation setup and the experimental procedure are given in reference (a). The method used in calibrating the instrumentation is given in reference (b). The results of this calibration are given in reference (a).

#### RESULTS

Figures 1 and 2 are plots of the decay rate (db/sec.) vs. 1/3-octave band center frequency in cps. Figure 1 is for panels 86, 87, and 88. Figure 2 is for panels 89 and 90. Acushnet Process Company personnel were unable to determine which compounds they had applied

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to each plate. Damping characteristics for two 30" X 30" X 1/8" and 30" X 30" X 60 mil untreated panels are also plotted as references in figures 1 and 2, respectively. The plots for the untreated plates are taken from reference (a). Figures 3 and 4 are plots of percent of critical damping vs. 1/3-octave band center frequency in cps. Figure 3 is for panels 86, 87, and 88; figure 4 is for panels 89 and 90. The plots of the 30" X 30" X 1/8" and the 30" X 30" X 60 mil untreated steel plates damping characteristics are also given in figures 3 and 4, respectively (reference (a)).

As can be seen from figures 3 and 4, the formulation on Plate 86 provides only very slightly better damping than the untreated plate in the 1/3-octave band center frequencies, starting at 800 cps and ending at 3200 cps, and at 100 cps and 200 cps.

The formulation on plate 87 provides only slightly better damping than the untreated steel plate in the 1/3-octave band center frequencies, starting at 1250 cps and ending at 4000 cps, and at 160 cps.

The formulation on plate 88 provides no significantly increased damping over the untreated steel plate.

Referring to figures 2 and 4, the formulation on plate 89 provides no significantly increased damping in any of the 1/3-octave bands.

The formulation on plate 90, which is coated on both sides, provides only slightly better damping than the untreated steel plate at the 1/3-octave band center frequencies of 125 cps, 200 cps, and 2000 cps.

It is noted that the compounds on plates 88 and 89 started to peel while being stored in air.

#### CONCLUSIONS

The polyurethane formulations (Acushnet Process Company ElastaCast compounds E902, E903, and E905) when applied to steel plates, do not improve the damping characteristics of the plates to any significant degree.

It is recommended that no further damping studies be made on this sprayable material for two reasons:

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No. 933-178-64

1. The material does not have adequate vibration damping properties.
2. Development is required to ensure that the formulations do not peel off the steel material on which they would have to be applied.

Howard N. Phelps, Jr.  
HOWARD N. PHELPS, JR.  
Mechanical Engineer

#### LIST OF REFERENCES

- (a) H. N. Phelps, Jr., "Damping Characteristics of Untreated Steel Plates," USL Technical Memorandum No. 933-54-64, dated 17 February 1964.
- (b) H. N. Phelps, Jr. and M. F. Borg, "Calibration of Instrumentation for Vibration and Damping Tests," USL Technical Memorandum No. 933-236-64, dated 22 August 1963.

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Internal

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930S (3)  
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933  
933.1  
932.2  
902  
904.2(5)  
G. T. Adkins  
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E. Recine  
H. N. Phelps, Jr.



Temperature 73 F.

DECAY RATE VS. 1/3 OCTAVE  
BAND CENTER FREQUENCY.

○ Plate 86.

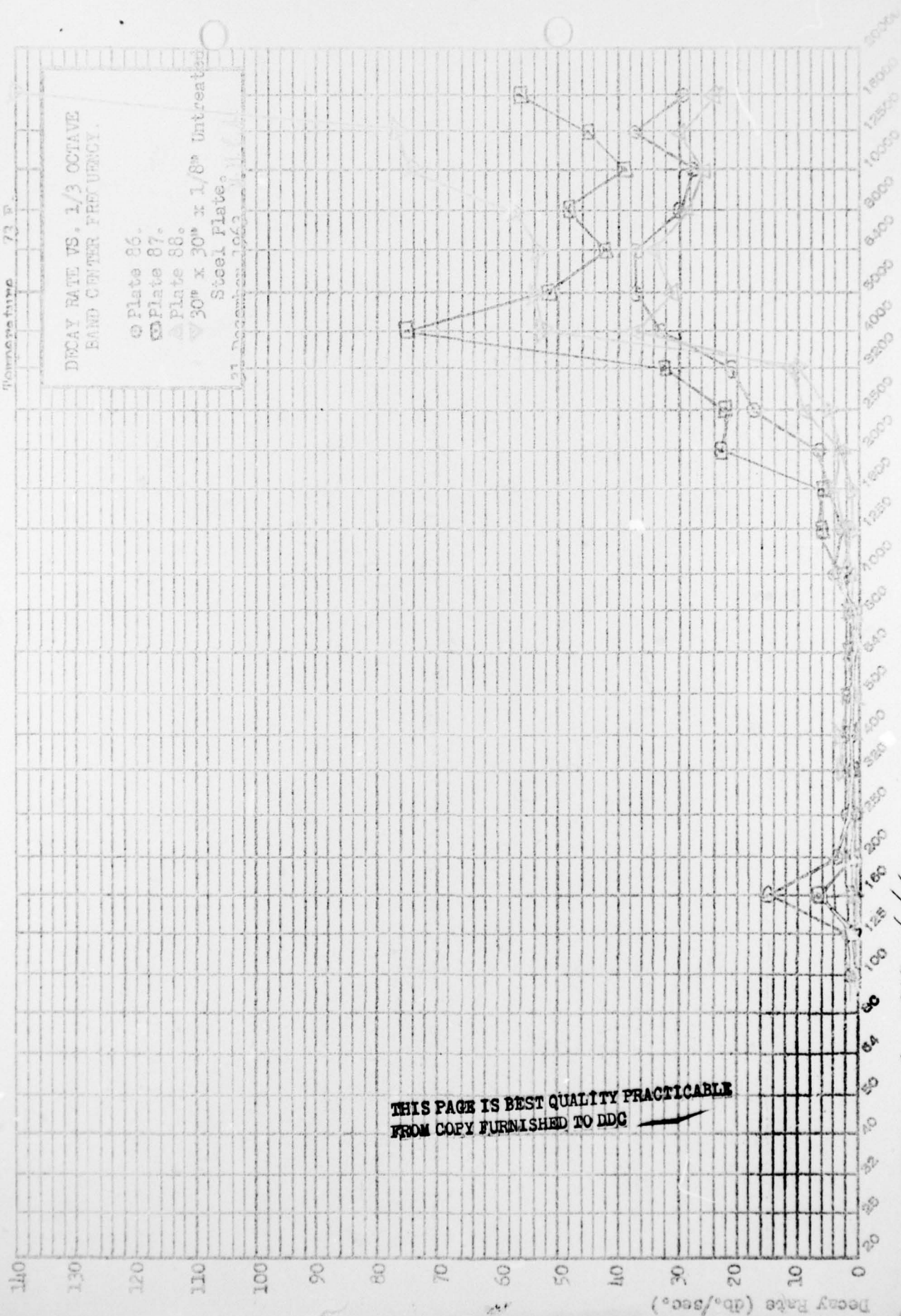
□ Plate 87.

△ Plate 88.

▽ 30" x 30" x 1/8" Untreated

Steel Plate.

21 December 1963



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THIRD-OCTAVE BAND CENTER FREQUENCY IN Cps

Figure 2c

Temperature 73 F.

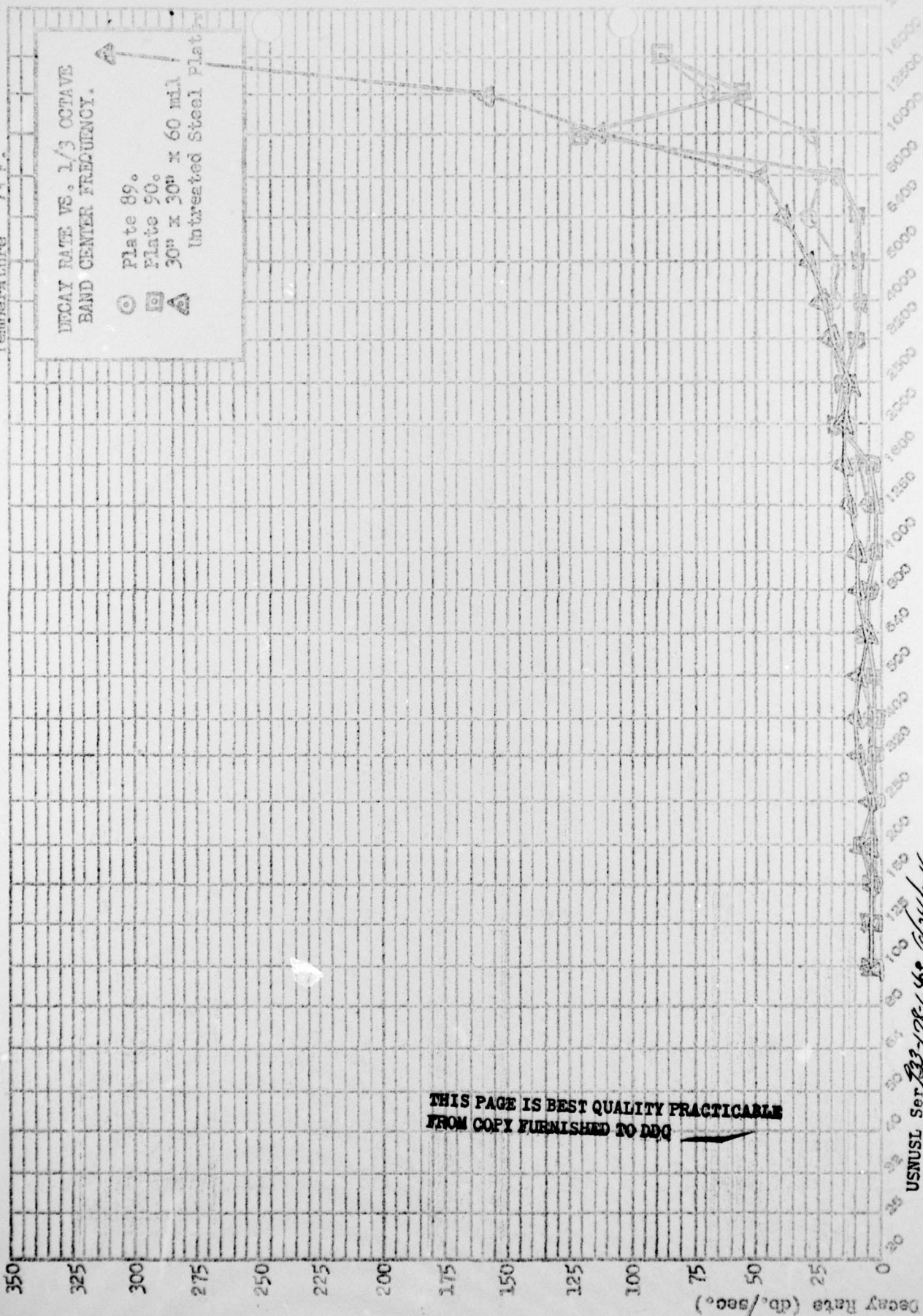
DECAY RATE VS. 1/3 OCTAVE  
BAND CENTER FREQUENCY.

○ Plate 89.

□ Plate 90.

30" x 30" x 60 mil

Untreated Steel Plates





%C/Cc = 0.168 @ 160 cps. (Plate 86)  
 %C/Cc = 0.0812 @ 160 cps. (Plate 87)

Temperature 73 F.

PERCENT OF CRITICAL DAMPING  
 VS. 1/3 OCTAVE BAND CENTER  
 FREQUENCY.

- Plate 86.
- Plate 87.
- △ Plate 88.

30" x 30" x 1/8" Untreated  
 Steel plate N.H.L.

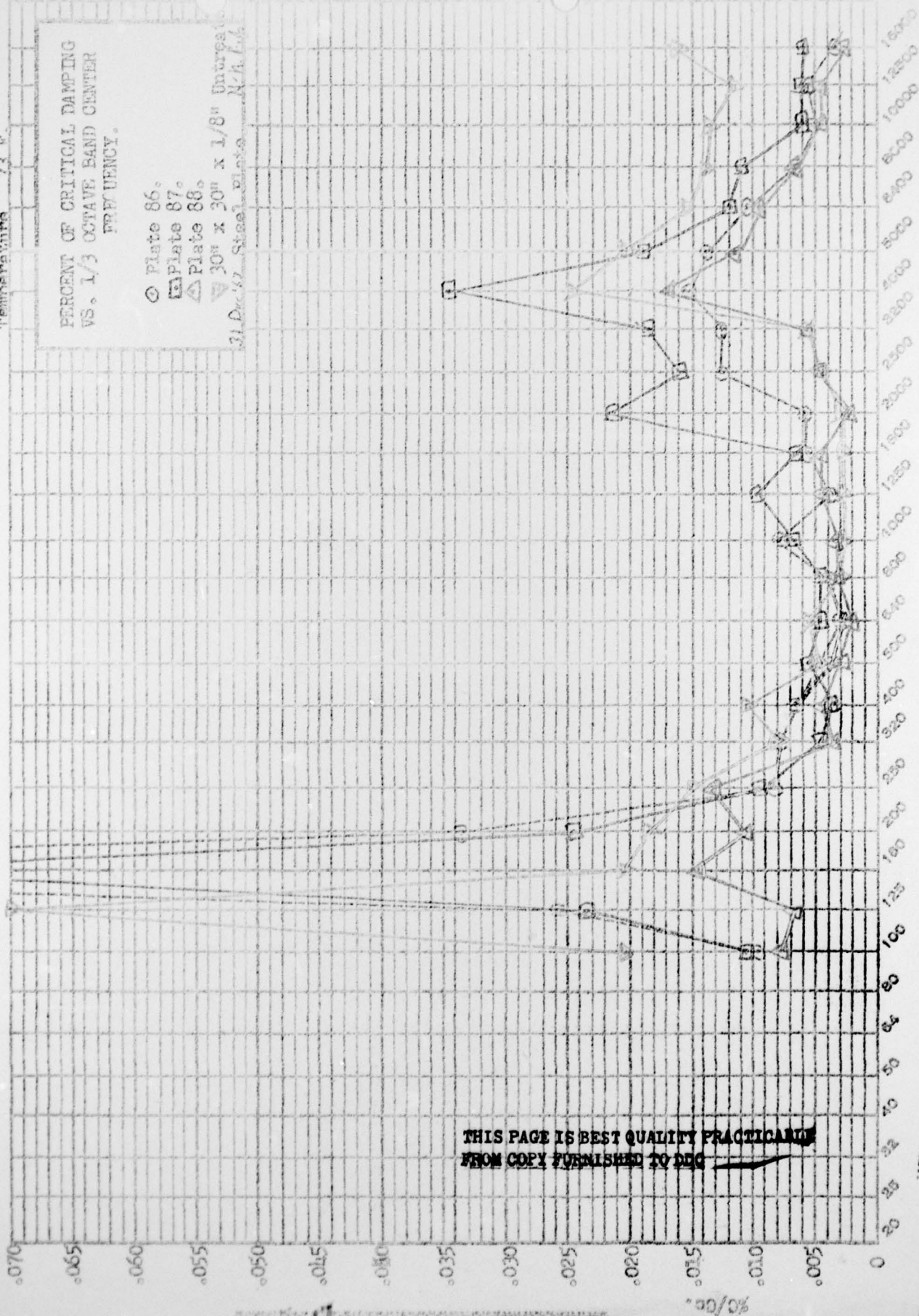


Figure 3.

THIRD-OCTAVE BAND CENTER FREQUENCY IN CPS

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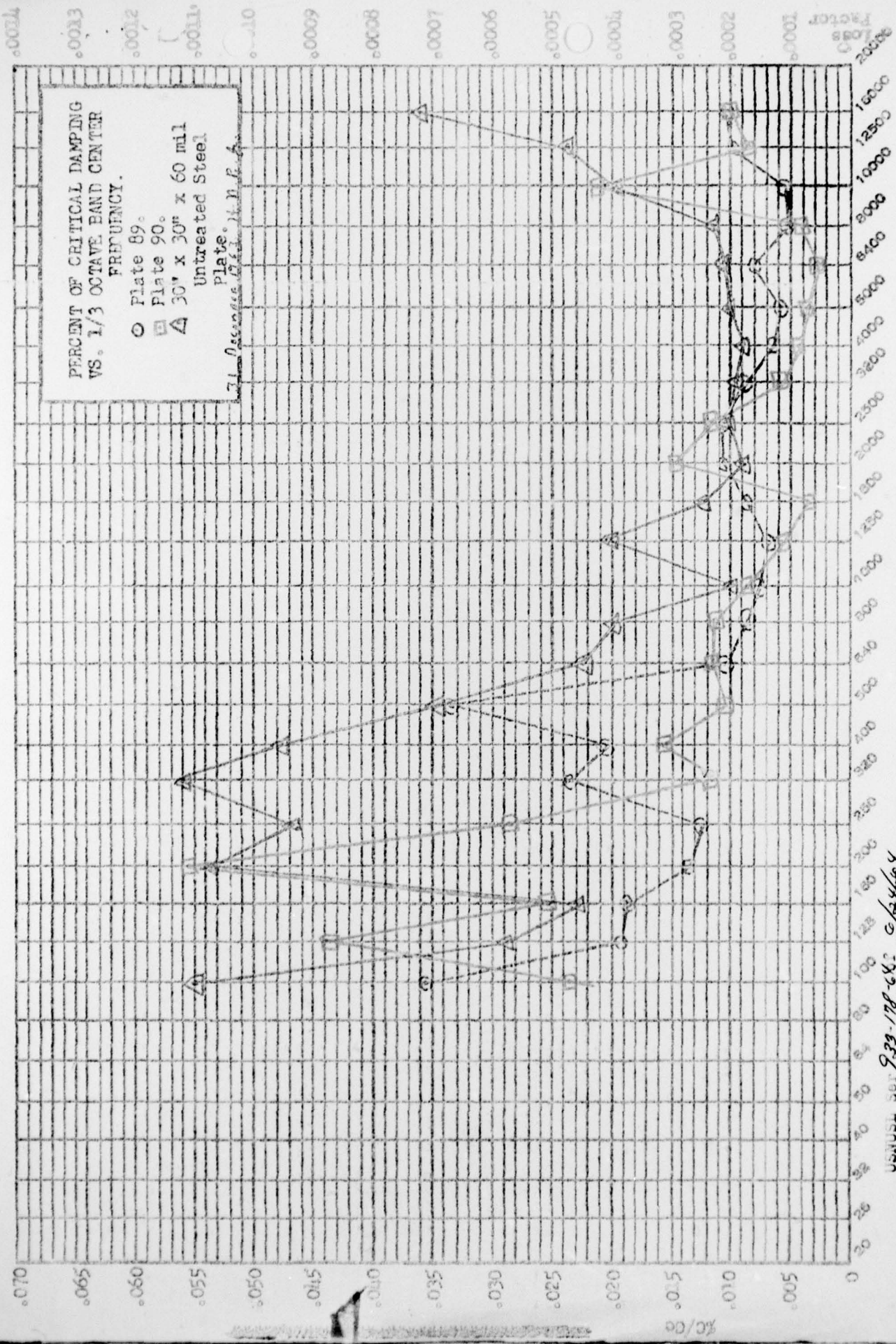


Figure 4.